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Longitudinal Associations of Sexual Fluidity and Health in Transgender Men and Cisgender Women and Men

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Research has just begun to study associations between sexual fluidity and health among cisgender individuals; only 1 cross-sectional study examined these links among transgender individuals. The goals of the current study were to prospectively examine fluidity in sexual attractions and fluidity in sexual orientation identity, and associations with health-related outcomes. Participants were a community-based sample of 45 transgender men, ages 16–51 years, who had recently begun testosterone, and 95 cisgender individuals (53 women, 42 men), ages 18–55 years, who completed surveys either in-person or via mail. Analyses tested for group differences in sexual fluidity, sociodemographic predictors of sexual fluidity among transgender men, and associations between sexual fluidity and health across the 3 groups. As hypothesized, transgender men reported more fluidity in sexual attractions and sexual orientation identity than did cisgender individuals. Contrary to our hypotheses, testosterone use was not significantly associated with sexual fluidity, although less education was. As hypothesized, fluidity in sexual orientation identity was associated with more adverse mental health outcomes among transgender men (depression and anxiety) and cisgender women (anxiety and stress), as well as decreased vitality among transgender men and cisgender women, and decreased social functioning among cisgender women. In contrast, fluidity in sexual attractions was only associated with less depression among cisgender women, but was not significantly associated with any other health-related outcomes. This study increases knowledge about sexual fluidity among transgender men and implications for health and can inform clinical work with this population.

Public Significance Statement

Fluidity in sexual orientation identity is associated with adverse mental health outcomes among transgender men and cisgender women. Medical and mental health providers working with transgender men should be aware of the likelihood of sexual attraction fluidity and sexual orientation identity fluidity, as well as the potential for adverse health-related concerns related to these changes.

Keywords: cisgender, mental health, physical health, sexual fluidity, transgender

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The growing body of research on sexual orientation and health has often utilized a minority stress framework to understand sexual orientation-related disparities in physical and mental health outcomes. Minority stress theory proposes that holding a stigmatized identity, such as sexual minority (e.g., lesbian, gay, bisexual, queer) or gender minority (e.g., transgender, gender diverse) exposes an individual to distal and proximal stressors that negatively impact health (Hendricks & Testa, 2012; Meyer, 2003). A number of different sexual minority stressors have been proposed and linked to negative health outcomes, including victimization (Burton, Marshal, Chisolm, Sucato, & Friedman, 2013; Mereish, O'Cleirigh, & Bradford, 2014), internalized stigma (Lehavot & Simoni, 2011; Newcomb & Mustanski, 2010), and early timing of sexual minority developmental milestones, such as age of first identifying as a sexual minority (Katz-Wise, Scherer, et al., 2015). More recently, sexual fluidity has been conceptualized as a potential sexual minority stressor that may be related to health, but research on the association between sexual fluidity and health has typically been limited to cisgender (non-transgender) individuals. Transgender individuals, for whom one's current gender identity does not match one's sex assigned at birth, may experience sexual fluidity as part of the process of transitioning from one gender to another (Katz-Wise, Reisner, White Hughto, & Keo-Meier, 2016). However, little is known about how sexual fluidity may be related to health among transgender individuals. The aim of the current study was to longitudinally examine associations between sexual fluidity and health among transgender men, who had recently begun testosterone, relative to cisgender women and men.

Sexual fluidity can be defined as changes in one or more dimensions of sexual orientation (i.e., identity, attractions, sexual behavior) over time (Katz-Wise, 2014). For example, an individual may identify as bisexual, then later identify as lesbian (fluidity in sexual orientation identity), or experience attractions toward more than one gender then later experience attractions toward only one gender (fluidity in sexual attractions). Change in sexual orientation identity may reflect actual change in orientation or other social considerations, such as learning about a new identity label that fits one's experiences better or choosing not to use a particular identity label in an unsupportive environment (Mereish, Katz-Wise, & Woulfe, 2017). Much of previous research on sexual fluidity has focused on the experiences of cisgender individuals. Cisgender women and men both report sexual fluidity, with mixed results regarding gender differences in the frequency with which sexual fluidity is reported (Dickson, van Roode, Cameron, & Paul, 2013; Katz-Wise, 2014; Kinnish, Strassberg, & Turner, 2005; Mock & Eibach, 2012; Ott, Corliss, Wypij, Rosario, & Austin, 2011; Savin-Williams & Ream, 2007). These studies found that frequency of sexual fluidity among cisgender individuals ranged from $<1\%$ to 66%, depending on the dimension of sexual orientation that was assessed. Sexual fluidity may also occur among transgender individuals, particularly related to the process of social and/or medical gender transitioning (Katz-Wise et al., 2016). Some individuals may experience an actual change in attractions, whereas other individuals may change their sexual orientation identity during the process of gender transitioning because the point of reference for sexual orientation shifts. For example, a transgender woman (assigned male at birth, identifies as a woman) who was attracted to men and identified as gay prior to transitioning, may identify as heterosexual after transitioning, assuming she remains attracted to men only.

A small number of studies have begun to investigate sexual fluidity among transgender individuals. A qualitative study of 20 transgender women found that six individuals (30%) reported a change in attractions from female-only to male-only during their gender transition (Daskalos, 1998). A mixed methods study of nine transgender men (assigned female at birth, with a male gender identity) found that all individuals in the sample reported a change in attractions from female-only to male-only or bisexual attractions during their gender transition (Coleman, Bockting, & Gooren, 1993). More recently, a large quantitative study of more than 600 self-identified transgender men found that 40% of the sample retrospectively self-reported change in sexual attractions during their gender transition (Meier, Pardo, Labuski, & Babcock, 2013). Individuals in this study who were attracted to women only prior to transitioning were the most likely group to report changes in sexual attraction (55%), regardless of whether they had undergone testosterone treatment. The most common change in attractions was an increase in attractions to men; 55% of individuals with attractions to women only shifted to having attractions either to men only or to both women and men, and 16% of individuals with attractions to both women and men shifted to having attractions to men only (Meier et al., 2013).

Another quantitative study of 452 transgender individuals that included both trans feminine (assigned male at birth, identify along the feminine spectrum) and trans masculine (assigned male at birth, identify along the masculine spectrum) individuals found that 58% had ever experienced changes in sexual attraction, and among individuals who had experienced a gender transition, 65% experienced a change in attractions after socially transitioning to their affirmed gender (Katz-Wise et al., 2016). In this study, individuals with non-binary gender identities (e.g., genderqueer, agender) were more likely than individuals with binary gender identities (e.g., transgender women, transgender men) to report changes in sexual attractions. Additionally, individuals reporting lifetime changes in attractions were more likely to have had medical gender affirmation (e.g., hormones, surgeries). It is clear that sexual fluidity occurs across gender identities, and that it may be more common among transgender individuals who have undergone a social or medical gender transition. However, no studies have examined sexual fluidity longitudinally among transgender individuals, who have recently begun testosterone, compared to cisgender individuals within the same sample.

To date, much of research on sexual fluidity has been limited to describing stability and change in sexual orientation over time. Although this work has contributed much to our understanding of sexual orientation as an ongoing developmental process, the practical implications of this research are unclear. More recently, studies have begun to link sexual fluidity to different physical and mental health outcomes among cisgender individuals. A study using longitudinal survey data from the Growing Up Today Study, a national prospective study of primarily cisgender adolescents and young adults in the United States, found that fluidity in sexual orientation identity was associated with greater substance use, particularly among females compared to males, and adolescents compared to young adults (Ott et al., 2013). In another study using the same longitudinal data, fluidity in sexual orientation identity was associated with higher body mass index at age 17 years among

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females, but not among males (Katz-Wise et al., 2014). A study of cisgender adolescents from the National Longitudinal Study of Adolescent to Adult Health, a representative survey of adolescents in the United States, found that changes in sexual orientation identity toward sexual minority identities were associated with increases in depressive symptoms (Everett, 2015). However, the mechanisms of this shift are as of yet unclear. Perhaps the increases observed in depressive symptoms are attributable to experiences of discrimination following the adoption of a sexual minority identity.

Although some degree of sexual fluidity is normative during adolescence and young adulthood, there is scant research that examines the relationships between sexual fluidity and minority stress (Meyer, 2003). Moreover, there is a dearth of literature that examines patterns or predictors of sexual fluidity across cisgender and transgender individuals in the same study sample. Therefore, it remains an open empirical question whether changes in sexual identities, behaviors, or attractions—particularly among transgender individuals—are a result of or correlated with sexual minority stress, experiences of discrimination, developmental experimentation, hormone use, or something else. Theoretically, multiple changes may indicate stress related to sexual minority identification, particularly if individuals are moving toward a same-gender orientation (e.g., same-gender attractions, sexual minority identity). Movement toward a same-gender orientation may reflect experiences of sexual minority stress if an individual is newly exposed to discrimination and prejudice related to holding a sexual minority status (Meyer, 2003). Conversely, individuals moving away from same-gender orientation (e.g., toward other-gender attractions or heterosexual identity) may be doing so as a response to experiencing sexual minority stress. However, it is unknown whether minority stress may be associated with sexual fluidity among transgender individuals, since most research on minority stress has focused on cisgender individuals.

Transgender individuals are vulnerable to multiple layers of oppression and discrimination, some of which may originate from former in-group members. For example, a transgender man who previously identified as lesbian and now identifies as heterosexual, may lose support from the lesbian community following the change in sexual orientation identity. Considering some previous research has indicated that sexual fluidity is associated with medical gender affirmation in transgender individuals (Katz-Wise et al., 2016), it is also possible that changes in sexual attractions may be due to hormone use, particularly testosterone use. However, other research has found that although sexual fluidity initially appeared to be associated with testosterone use among transgender men, after pre-transition attractions were accounted for, testosterone use no longer predicted changes in attractions (Meier et al., 2013). More research is needed to determine whether there is indeed an association between sexual fluidity and testosterone use.

To our knowledge, only one study has examined associations between sexual fluidity and health among transgender individuals (including male assigned at birth and female assigned at birth), using the same data that was used to examine frequency of sexual fluidity among transgender individuals (Katz-Wise et al., 2016). In this cross-sectional study, individuals who reported changes in attractions during their lifetime were more likely than individuals not reporting changes in attractions to report negative mental health outcomes, such as self-harm, suicidality, and depression (Katz-Wise, Reisner, White Hughto, & Budge, 2017). However, changes in attractions after socially transitioning were not significantly associated with mental health outcomes. Although some research has begun to investigate links between sexual fluidity and health among transgender individuals, more research is needed to strengthen existing findings and determine how sexual fluidity may be related to physical health outcomes, in addition to mental health outcomes. More research is also needed that includes both transgender and cisgender individuals and uses longitudinal methods to determine temporality of associations between sexual fluidity and health.

The aim of this study was to examine fluidity in sexual attractions and fluidity in sexual orientation identity and associations with health-related outcomes, using longitudinal data collected in 6-month intervals across one year from a community-based sample of adult cisgender women and men, and transgender men who had recently begun testosterone. First, we hypothesized that transgender men would report more fluidity in sexual attractions and sexual orientation identity over time, compared to cisgender individuals (H1). Second, we hypothesized that among transgender men, testosterone use would be associated with more fluidity in sexual attractions and sexual orientation identity, such that participants would report more sexual fluidity after starting testosterone compared to the time prior to starting testosterone (H2). Third, we hypothesized that among both cisgender individuals and transgender men, sexual fluidity would be associated with more adverse health-related outcomes (H3).

Method

Participants

Participants were a community-based sample of 45 transgender men, ages 16–51 years, who had recently begun testosterone, and 95 cisgender individuals (53 women, 42 men), ages 18–54 years. Eligibility criteria for transgender men included: currently identifying as FTM (female-to male) or identified as FTM in the past and currently identifying as male, and recent initiation (past month) of testosterone therapy or intention to begin testosterone therapy within six months, and maintain hormone treatment for at least one year. Transgender men who had begun testosterone therapy within the previous month were considered eligible because masculinizing effects generally do not occur until three or more months after initiating treatment (Gooren, 2005; Gooren, Giltay, & Bunck, 2008; Hembree et al., 2009). Eligibility criteria for cisgender individuals included: age 18 years or older, do not identify as transgender, post-pubertal based on self-report, and no history of hypogonadism or hormone imbalance. One cisgender woman was excluded because she became pregnant during the study.

Race/ethnicity of the sample was 69% White for transgender men, 62% White for cisgender men, and 58% White for cisgender women. Most participants had at least some college (85% of transgender men, 90% of cisgender men and women) and participants were geographically distributed across all regions of the United States, with most participants (46% of transgender men, 93% of cisgender men, and 92% of cisgender women) residing in the south central United States. All other sociodemographic characteristics assessed at baseline are reported in Table 1.

Table 1
Sociodemographic Characteristics at Baseline

Measure	Transgender men (n = 45)	Cisgender men (n = 42)	Transgender men vs. cisgender men (p value)	Cisgender women (n = 53)	Transgender men vs. cisgender women (p value)
Age in years, *M* (*SD*)	25.5 (22.0, 30.0)	24.5 (21.0, 29.0)	.77	24.0 (21.5, 27.5)	.50
Race/ethnicity, *n* (%)			.49		.26
White	29 (69)	26 (62)		30 (57.7)	
Another race/ethnicity	13 (31)	16 (38)		22 (42.3)	
Education, *n* (%)			.93		.69
Less than high school degree	1 (2.6)	0		0	
High school degree	5 (12.8)	4 (9.8)		5 (9.8)	
Some college	15 (38.5)	17 (41.5)		21 (41.2)	
College degree	14 (35.9)	14 (34.1)		16 (31.4)	
Post graduate	4 (10.3)	6 (14.6)		9 (17.6)	
City type, *n* (%)			.04		.01
Metropolitan/large city	20 (47.6)	31 (73.8)		40 (78.4)	
Small city	17 (40.5)	10 (23.8)		10 (19.6)	
Rural/country	5 (11.9)	1 (2.4)		1 (2.0)	
Geographic region, *n* (%)			<.001		<.001
Northwest	5 (12.5)	0		0	
Southwest	4 (10.0)	1 (2.4)		2 (4.3)	
North central	6 (15.0)	2 (4.9)		2 (4.3)	
South central	17 (42.5)	38 (92.7)		43 (91.5)	
Northeast	3 (7.5)	0		0	
Southeast	5 (12.5)	0		0	
Work status, *n* (%)			.52		.28
Full-time	12 (37.5)	20 (51.3)		18 (40.9)	
Part-time	5 (15.6)	6 (15.4)		11 (25.0)	
Seasonal/temporary	0	0		3 (6.8)	
Unemployed/not working	2 (6.3)	3 (7.7)		2 (4.5)	
Disability	2 (6.3)	0		0	
Student	11 (34.4)	10 (25.6)		10 (22.7)	
Relationship status, *n* (%)			.09		.08
Single	11 (26.2)	19 (46.3)		17 (32.7)	
Dating	3 (7.1)	0		5 (9.6)	
Partnered/relationship	15 (35.7)	13 (31.7)		21 (40.4)	
Engaged	2 (4.8)	4 (9.8)		1 (1.9)	
Married	11 (26.2)	5 (12.2)		8 (15.4)	

Note. Age range: 16–51 years (transgender men), 18–54 years (cisgender men), 18–50 years (cisgender women).

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Transgender men were recruited using purposive sampling from the following sources: University of Houston subject pool, Houston community, personal contacts, transgender conferences, advertisements on online groups and blogs for transgender men, and support groups for transgender men in the United States. One cisgender man and one cisgender woman were recruited as control participants to match each transgender man based on age and education level. Cisgender participants were recruited via the subject pool at the University of Houston and within the Houston community. Recruitment materials asked for individuals to participate in a study about the effects of hormone therapy on transgender men, with cisgender individuals as controls.

Measures

Sexual orientation and sexual fluidity. Sexual attractions were assessed at each wave with one categorical item with four response options: *men, women, men and women, neither/asexual*. Participants who responded *neither/asexual* were excluded from analyses. This variable was recoded into two new variables to represent number of changes and directionality of changes in sexual attractions. Number of changes in sexual attractions was coded as: 0 = no changes, 1 = 1 change, 2 = 2 changes. Higher scores represent greater fluidity in sexual attractions.

Sexual orientation identity was assessed at each wave with one open-ended item, which was recoded into the following groups: *heterosexual, mostly heterosexual, bisexual, mostly lesbian/gay, lesbian/gay, queer, pansexual,* and *other*. Like sexual attractions, sexual orientation identity was recoded into two new variables to represent number of changes and directionality of changes in sexual orientation identity. Number of changes in sexual orientation identity was coded as: 0 = no changes, 1 = 1 change, 2 = 2 changes. Higher scores represent greater fluidity in sexual orientation identity.

Fluidity in sexual attractions since transition was assessed among transgender men at each wave with one categorical item, "In what way has your sexual orientation changed since you started your transition?" with eight response options: *no change*; *previously male-attracted, currently female-attracted*; *previously male-attracted, currently bisexually attracted*; *previously female-attracted, currently male attracted*; *previously female-attracted, currently bisexually attracted*; *previously bisexually attracted, cur-*

rently female attracted; *previously bisexually attracted, currently male-attracted*; *have not started transition.*

Sociodemographic predictors of sexual fluidity. Testosterone use was assessed at each wave with two binary items, "Have you ever used hormones as part of gender confirmation?" and for participants who responded *yes*, "Are you currently using hormones?" (*yes, no*). Categories for other sociodemographic predictors are listed in Table 1.

Health-related outcomes. Substance use was assessed at each wave with one binary item for alcohol use, "Have you ever had a problem with alcohol?" (*yes, no*) and one binary item for drug use, "Have you ever had a problem with drugs?" (*yes, no*). Depression, anxiety, and stress were assessed at each wave using three separate subscales of the DASS-42 (Lovibond & Lovibond, 1995). Subscale reliability, as assessed by Cronbach's alpha, ranges from .90 to .97 (Crawford & Henry, 2003). In addition, a study of these subscales among transgender men found internal consistency to range from .86 to .95 (Meier, Fitzgerald, Pardo, & Babcock, 2011). Higher scores indicate greater depression, anxiety, and stress. Suicide attempts were assessed at each wave with two items: One binary item assessed suicide attempts in general, "Have you ever attempted suicide?" (*yes, no*). A follow-up open-ended item assessed number of suicide attempts among those who responded *yes* to the initial item.

The following components of health-related quality of life were assessed at each wave with subscales from the SF36-v2 (Ware, Snow, & Kosinski, 2002): physical functioning, role limitations attributable to physical health problems, role limitations attributable to emotional problems, vitality, social functioning, bodily pain, and general health. Reliability for the subscales, as assessed by Cronbach's alpha, ranges from .93 to .95 (Ware, Kosinski, & Dewey, 2000). In a previous study of transgender men, this measure was used and was found to be appropriate for this population (Newfield, Hart, Dibble, & Kohler, 2006). Higher scores indicate better health-related quality of life in each domain.

Procedure

Data were collected across three waves in 2009–2013: Wave 1 (baseline), Wave 2 (six months), and Wave 3 (one year). For inclusion in the current analysis, participants must have completed all three waves of data collection. Local participants completed each wave of data collection at the Psychological Research and Services Clinic (PRSC) at the University of Houston. Nonlocal participants were mailed a paper survey with a stamped return envelope at each wave. At each time point, participants gave informed consent and completed the measures via paper survey. As a control for fluctuating hormone levels, females completed the protocol during their menstrual cycle at each assessment. Each participant received up to $40 in gift cards for participating: $10 for completing Wave 1, $10 for completing Wave 2, and $20 for completing Wave 3. All study procedures were approved by the University of Houston IRB.

Analytic Methodology

First, we examined frequency of all categorical variables and mean, median, and range for all continuous variables by type of participant (transgender men, cisgender women, cisgender men). Comparisons were made between transgender men and cisgender women, and between transgender men and cisgender men using *t* tests for continuous variables and Fisher's exact tests for categorical variables. To test H1, we compared transgender men with cisgender women, and transgender men with cisgender men on number of changes in sexual attractions and sexual orientation identity, using Fisher's exact tests. To test H2, we used linear (for continuous outcomes) and logistic (for categorical outcomes) regression models to test whether testosterone use, age, race/ethnicity, education, city type, geographic region, work status, and relationship status predicted (a) number of changes in sexual attractions and (b) number of changes in sexual orientation identity among transgender men. Separate models were conducted with each sociodemographic variable as the predictor and each sexual fluidity variable as the outcome.

To test H3, linear regression models were conducted with number of changes in sexual attractions and sexual orientation identity as the predictors and continuous health-related variables from Wave 3 as the outcomes (depression, anxiety, stress, health-related quality of life subscales). Where outcomes were dichotomous (0/1), logistic regression models were conducted to test whether number of changes in sexual attractions and sexual orientation identity were associated with health-related outcomes (alcohol use, drug use, suicide attempts) assessed at Wave 3. Models were stratified by participant type (transgender men, cisgender women, cisgender men) and controlled for age, race/ethnicity, education, and geographic region. Models predicting alcohol use, drug use, and suicide attempts were only conducted for transgender men, because these measures were not assessed among cisgender individuals. In addition, models for drug use were adjusted for age, education, and geographic region, but not for race/ethnicity; the small number of participants who endorsed a race/ethnicity other than White did not allow models to converge.

Among 140 total responses (45 transgender men, 53 cisgender women, 42 cisgender men), incomplete or missing data differed by gender identity and by variable. The highest rate of missing data was for race/ethnicity, ranging from approximately 8% (cisgender women) to 14% (cisgender men). Where possible, analyses were completed using available data; where it was not possible to complete the analyses, table cells are denoted with N/A (insufficient data for this category).

Results

Sample demographic characteristics at baseline are reported in Table 1. The three groups (transgender men, cisgender men, cisgender women) differed significantly on city type and geographic region. Cisgender men and women were more likely to live in a metropolitan/large city, whereas transgender men had greater variability in their city type; most lived in either a metropolitan/large city or in a small city. Regarding geographic region, most cisgender men and women lived in the south central United States, whereas transgender men were from a wider range of geographic regions, although they were still concentrated in the south central United States.

Descriptive analyses and group comparisons for sexual orientation and sexual fluidity measures are reported in Tables 2, 3, and 4. Significant differences across groups were found for sexual attractions and sexual orientation identity at baseline (see Table 2).

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Table 2
Descriptive Statistics and Group Comparisons for Sexual Orientation and Sexual Fluidity Measures

Measure	Transgender men (n = 45)	Cisgender men (n = 42)	Transgender men vs. cisgender men (p value)	Cisgender women (n = 53)	Transgender men vs. cisgender women (p value)
Sexual orientation					
Sexual attractions at baseline, n (%)			.02		.03
Men	3 (7.1)	3 (7.1)		33 (67.3)	
Women	24 (57.1)	34 (81.0)		4 (8.2)	
Men and women	15 (35.7)	5 (11.9)		12 (24.5)	
Sexual orientation identity at baseline, n (%)			<.001		<.01
Heterosexual	15 (34.1)	32 (80.0)		32 (64.0)	
Mostly heterosexual	1 (2.3)	1 (2.5)		2 (4.0)	
Bisexual	5 (11.4)	3 (7.5)		6 (12.0)	
Mostly lesbian/gay	10 (22.7)	3 (7.5)		4 (8.0)	
Lesbian/gay	7 (15.9)	1 (2.5)		3 (6.0)	
Queer	6 (13.6)	0		3 (6.0)	
Pansexual	1 (2.3)	0		3 (6.0)	
Other	5 (11.4)	0		0	
Sexual fluidity (SF)					
Fluidity in sexual attractions, n (%)			.02		<.01
No change	28 (75.7)	39 (92.9)		47 (95.9)	
1 change	8 (21.6)	3 (7.1)		1 (2.0)	
2 changes	1 (2.7)	0		1 (2.0)	
Fluidity in sexual orientation identity, n (%)			<.001		<.001
No change	22 (53.7)	39 (95.1)		45 (88.2)	
1 change	13 (31.7)	1 (2.4)		6 (11.8)	
2 changes	6 (14.6)	1 (2.4)		0	
Fluidity in sexual attractions since transition, n (%)					
No change	28 (66.7)				
Men to women	0				
Women to men	1 (2.4)				
Both women and men to women	1 (2.4)				
Both women and men to men	6 (14.3)				
Have not started transition	3 (7.1)				

Note. Fluidity in sexual attractions since transition was assessed only for transgender men.

Regarding sexual attractions, over half (57.1%) of transgender men reported attractions toward women only, compared to 81% of cisgender men and 8.2% of cisgender women. More than a third (35.7%) of transgender men reported attractions to both men and women, compared with 11.9% of cisgender men and 24.5% of cisgender women. Most cisgender women (67.3%) reported attractions to men only. Regarding sexual orientation identity, transgender men reported a range of identity labels, with the most frequently selected identities being heterosexual (34.1%) or "mostly lesbian/gay" (22.7%). Cisgender men and cisgender women were most likely to identify as heterosexual (80% and 64%, respectively), with the next most frequent identity being bisexual among cisgender women (12%).

H1: Group Differences in Sexual Fluidity

Significant group differences were found in number of changes in sexual attractions and sexual orientation identity (see Table 2). Consistent with our hypotheses, transgender men reported more fluidity in sexual attractions and sexual orientation identity than either cisgender men or cisgender women. Specifically, 24.3% of transgender men reported one or more changes in attractions, compared with 7.1% of cisgender men and 4.0% of cisgender women. Regarding fluidity in sexual orientation identity, 46.3% of transgender men reported one or more changes, compared with 4.8% of cisgender men and 11.8% of cisgender women.

Regarding directionality of fluidity in sexual attractions across Waves 1–3, of those reporting changes, the most frequent changes among transgender men were from attractions toward women only to attractions toward both men and women (n = 10), and from attractions toward both men and women to attractions toward women only (n = 6; see Table 3). Three transgender men in the sample also changed from attractions toward both men and women to attractions toward men only. The most frequent change among cisgender women was from attractions toward both men and women to attractions toward women only (n = 4) and among cisgender men, the most frequent change was from attractions toward both men and women to attractions toward men only (n = 2).

Regarding directionality of fluidity in sexual orientation identity across Waves 1–3, of those reporting changes, the most frequent changes among transgender men were from heterosexual to another identity (n = 5) and from another identity to bisexual (n = 3; see Table 4). Two transgender men in the sample also changed from heterosexual or mostly heterosexual to bisexual, two transgender men changed from bisexual to mostly heterosexual or queer, and two transgender men changed from lesbian/gay to queer

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Table 3
Directionality of Fluidity in Sexual Attractions Across Waves 1–3

From:	To: Men only	To: Women only	To: Men and Women
Transgender men (n = 45)			
Men only	0/0/0	0/0/0	0/2/0
Women only	0/0/0	0/0/0	7/3/0
Men and women	1/1/1	2/4/0	0/0/0
Cisgender women (n = 53)			
Men only	0/0/0	2/0/0	0/0/0
Women only	0/1/0	0/0/0	0/1/0
Men and women	0/0/0	1/2/1	0/0/0
Cisgender men (n = 42)			
Men only	0/0/0	1/0/0	0/0/0
Women only	0/0/0	0/0/0	0/0/0
Men and women	1/1/0	0/0/0	0/0/0

Note. Numbers represent the number of individuals who reported a change in the directionality of sexual attractions between each wave: change from W1 to W2/change from W2 to W3/change from W1 to W3.

or another identity. The most frequent change among cisgender women was from mostly heterosexual to bisexual (n = 2) and among cisgender men, from another identity to bisexual (n = 2).

H2: Predictors of Sexual Fluidity Among Transgender Men

Among transgender men, the majority (66.7%) did not experience a change in sexual attractions since transitioning (see Table 2); however, 14.3% reported changing attractions from both women and men to men only since their transition. We examined several sociodemographic predictors of sexual fluidity among transgender men, including testosterone use (see Table 5). Contrary to our hypothesis, testosterone use was not significantly associated with number of changes in sexual attractions or number of changes in sexual orientation identity. In fact, most sociodemographic predictors were not significantly associated with sexual fluidity among transgender men, apart from education, which was significantly associated with number of changes in sexual attractions, but not with number of changes in sexual orientation identity. That is, transgender men with less education reported more fluidity in their sexual attractions.

H3: Sexual Fluidity and Health-Related Outcomes

Substance use and mental health. Results from models testing associations between number of changes in sexual attractions and number of changes in sexual orientation identity, and mental health-related outcomes are reported in Table 6. Among transgender men, more fluidity in sexual orientation identity was significantly associated with greater depression, anxiety, and stress. More fluidity in sexual orientation identity was also significantly associated with greater anxiety and stress among cisgender women. However, number of changes in sexual attractions was significantly associated only with less depression among cisgender women; it was not significantly associated with substance use in transgender men or with any other mental health outcome across the three groups. In addition, fluidity in sexual orientation identity was not significantly associated with mental health outcomes among cisgender men. Thus, our hypothesis was supported for mental health outcomes among transgender men and cisgender women, but not for substance use or for mental health status among cisgender men.

Table 4
Directionality of Fluidity in Sexual Orientation Identity Across Waves 1–3

From:	To: Heterosexual	To: Mostly heterosexual	To: Bisexual	To: Lesbian/gay	To: Queer	To: Another identity
Transgender men (n = 45)						
Heterosexual	0/0/0	0/0/0	0/1/1	0/0/0	1/0/0	2/3/0
Mostly heterosexual	0/1/0	0/0/0	0/1/1	0/0/0	0/0/0	0/0/0
Bisexual	1/0/0	0/1/1	0/0/0	0/0/0	1/1/0	1/0/0
Lesbian/gay	1/0/1	0/0/0	0/0/0	0/0/0	1/1/0	1/0/1
Queer	0/0/0	0/1/0	0/1/0	0/0/0	0/0/0	1/0/0
Another identity	1/0/0	1/0/0	0/2/1	0/1/0	0/0/0	0/0/0
Cisgender women (n = 53)						
Heterosexual	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0
Mostly heterosexual	1/0/0	0/0/0	0/1/1	0/0/0	0/0/0	1/0/0
Bisexual	0/0/0	0/0/0	0/0/0	0/0/0	1/0/0	0/0/0
Lesbian/gay	0/0/0	0/0/0	0/0/0	0/0/0	0/1/0	0/0/0
Queer	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0
Another identity	0/0/0	0/1/0	0/0/0	0/1/0	0/0/0	0/0/0
Cisgender men (n = 42)						
Heterosexual	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0
Mostly heterosexual	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0
Bisexual	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	1/0/0
Lesbian/gay	0/0/0	0/0/0	1/0/0	0/0/0	0/0/0	0/0/1
Queer	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0
Another identity	0/0/0	0/0/0	0/2/0	0/0/0	0/0/0	0/0/0

Note. Numbers represent the number of individuals who reported a change in the directionality of sexual orientation identity between each wave: change from W1 to W2/change from W2 to W3/change from W1 to W3. "Lesbian/gay" combines the categories "mostly lesbian/gay" and "lesbian/gay"; "another identity" combines the categories "pansexual" and "other".

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Table 5
Sociodemographic Predictors of Sexual Fluidity Among Transgender Men (N = 45)

Predictor	Fluidity in sexual attractions β (*SE*)	Fluidity in sexual orientation identity β (*SE*)
Testosterone use	−.43 (.79)	−.42 (.47)
Age	−.10 (.06)	.02 (.02)
Race/ethnicity		
White	Ref	Ref
Another race/ethnicity	−.11 (.69)	.25 (.43)
Education		
Education	−.73 (.32)*	−.13 (.23)
City type		
Small city	Ref	Ref
Rural/country	−.61 (1.08)	.06 (.67)
Metropolitan/large city	−1.12 (.71)	.14 (.43)
Geographic region		
South central	Ref	Ref
Other regions	−.94 (.71)	−.50 (.37)
Work status		
Full-time	Ref	Ref
Part-time	N/A	−.90 (1.06)
Seasonal/temporary	N/A	N/A
Unemployed/not working	.69 (1.16)	.89 (.68)
Disability	N/A	.49 (.79)
Student	.58 (.76)	.17 (.5)
Relationship status		
Single	Ref	Ref
Dating	N/A	N/A
Partnered/relationship	−1.18 (.79)	−.37 (.47)
Engaged	N/A	−.08 (.76)
Married	N/A	−.37 (.76)

Note. Ref = reference group. N/A = insufficient data for this category. Separate models were conducted with each sociodemographic variable as the predictor and each sexual fluidity variable as the outcome.
* $p < .05$.

Health-related quality of life. Results from models testing associations between number of changes in sexual attractions and sexual orientation identity and health-related quality of life outcomes for transgender men and cisgender individuals are reported in Table 7. Among transgender men, more fluidity in sexual orientation identity was significantly associated with poorer vitality. More fluidity in sexual orientation identity was also significantly associated with poorer mental health and poorer social functioning among cisgender women. However, number of changes in sexual attractions was not associated with any health-related quality of life outcomes across the three groups. In addition, fluidity of sexual orientation identity was not significantly associated with health-related quality of life among cisgender men. Thus, like for mental health, our hypothesis was partially supported for health-related quality of life for some subscales among transgender men and cisgender women, but not for cisgender men.

Discussion

The aim of this study was to examine fluidity in sexual attractions and sexual orientation identity and longitudinal associations with health-related outcomes among transgender men, as compared with cisgender women and men. As hypothesized, transgender men reported more fluidity in sexual attractions and sexual orientation identity than cisgender men and women. One potential explanation for greater sexual fluidity among transgender men compared to cisgender men may be because transgender men were assigned female at birth and some research has found that females are more sexually fluid than males (Dickson et al., 2013; Mock & Eibach, 2012) within some sexual orientation groups (Kinnish et al., 2005), although other research has found no gender difference in likelihood of sexual fluidity, particularly among sexual minorities (Katz-Wise, 2014; Ott et al., 2013). However, this does not explain why transgender men were more likely than cisgender women to experience sexual fluidity when they were compared in the same sample.

Previous studies using large samples of transgender individuals found that 40% of transgender men reported changes in sexual attractions during their gender transition (Meier et al., 2013), and 65% of trans masculine and trans feminine individuals reported changes in sexual attractions after socially transitioning to their affirmed gender (Katz-Wise et al., 2016). In comparison, the current study found that 24% of transgender men reported one or more changes in attractions and 46% reported one or more changes in sexual orientation identity across one year. The percentage of transgender men reporting fluidity in sexual attractions in the current study is lower than in previous studies, which may be

Table 6
Sexual Fluidity Predictors of Substance Use and Mental Health Outcomes Among Transgender Men and Cisgender Individuals

Sexual fluidity	Alcohol use β (*SE*)	Drug use β (*SE*)	Depression β (*SE*)	Anxiety β (*SE*)	Stress β (*SE*)	Suicide attempts β (*SE*)
Transgender men (n = 45)						
Sexual attractions	−.44 (.90)	4.15 (4.64)	.10 (.30)	.03 (.29)	.51 (.35)	−1.39 (1.18)
Sexual orientation identity	−.63 (.71)	38.88 (.0)	.36 (.16)*	.50 (.14)**	.50 (.16)**	.29 (.67)
Cisgender women (n = 53)						
Sexual attractions	N/C	N/C	−1.10 (.53)*	−.49 (.53)	−.20 (.57)	N/C
Sexual orientation identity	N/C	N/C	.62 (.43)	.82 (.41)*	.91 (.42)*	N/C
Cisgender men (n = 42)						
Sexual attractions	N/C	N/C	−.25 (.62)	−.25 (.6)	.15 (.53)	N/C
Sexual orientation Identity	N/C	N/C	.52 (.44)	.19 (.36)	−.33 (.34)	N/C

Note. Models controlled for age, race/ethnicity, education, and geographic region (south central vs. other regions). Models with drug use as an outcome only controlled for age and education, because the models did not converge when race/ethnicity was added as a covariate. N/C = outcome measures not collected for these groups.
* $p < .05$. ** $p < .01$.

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Table 7
Sexual Fluidity Predictors of Health-Related Quality of Life Outcomes Among Transgender Men and Cisgender Individuals

Sexual fluidity	Physical functioning β (*SE*)	Role limitations-physical β (*SE*)	Role limitations-emotional β (*SE*)	Vitality β (*SE*)	Mental health β (*SE*)	Social functioning β (*SE*)	Bodily pain β (*SE*)	General health β (*SE*)
Transgender men (n = 45)								
Attractions	−.04 (.06)	.02 (.07)	−.06 (.15)	−.05 (.13)	.01 (.05)	.05 (.13)	−.16 (.10)	−.08 (.10)
Identity	−.02 (.04)	.01 (.04)	−.07 (.09)	−.20 (.07)**	−.04 (.03)	−.09 (.08)	−.06 (.07)	−.01 (.06)
Cisgender women (n = 53)								
Attractions	.04 (.02)	−.03 (.11)	.08 (.17)	.21 (.22)	.06 (.18)	.01 (.17)	−.002 (.14)	.07 (.20)
Identity	.003 (.02)	−.13 (.08)	−.16 (.14)	−.29 (.18)	−.31 (.15)*	−.40 (.13)**	−.09 (.12)	−.30 (.16)
Cisgender men (n = 42)								
Attractions	.01 (.02)	.06 (.08)	.06 (.10)	−.04 (.15)	−.05 (.10)	.09 (.08)	.06 (.10)	−.06 (.11)
Identity	.01 (.02)	.03 (.06)	−.04 (.15)	−.04 (.12)	−.04 (.08)	−.09 (.06)	−.09 (.07)	−.03 (.09)

Note. Models controlled for age, race/ethnicity, education, and geographic region (south central vs. other regions).
* $p < .05$. ** $p < .01$.

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attributable, in part, to the sample of transgender men in the current study being newer to transitioning (i.e., they had recently begun taking testosterone). It is possible that these transgender men may experience greater fluidity in sexual attractions later in their transition process. These findings extend previous research to demonstrate sexual fluidity in transgender men longitudinally across one year, rather than at one time point, as previous cross-sectional studies have done. As the first study, to our knowledge, to document change in sexual orientation identity—rather than in attractions only—among transgender men, no clear pattern was found regarding directionality of fluidity; rather, there was variability in the directionality of fluidity in sexual orientation identity. These data suggest that it is not only common for transgender men to experience changes in attractions during the medical gender affirmation process, but that many transgender men may also adjust their sexual orientation identity either to reflect their changing attractions, or to reflect their own understanding of their sexual orientation in relation to their gender identity.

This study also examined predictors of sexual fluidity, including testosterone use, among transgender men. Previous research has found that changes in attractions were common among transgender individuals who were undergoing gender affirmation treatments, including hormone therapy and surgeries (Katz-Wise et al., 2016). Contrary to our hypothesis, the current study did not find a significant association between testosterone use and fluidity of sexual attractions or sexual orientation identity across one year. Perhaps this lack of association was attributable to the 1-year time frame of this study, whereas previous research found this association for lifetime fluidity in sexual attractions (Katz-Wise et al., 2016). A variable not addressed in the current study, which may be related to testosterone use and sexual fluidity is the timing of realization of transgender identity. It is possible that individuals who realize their gender identity at a younger age may have longer to be fluid with their sexual orientation identity and attractions, regardless of whether and when they began taking testosterone. In the current study, all transgender men participants had started testosterone within three months of baseline, so there was little variability in timing of testosterone use across the study period. Thus, it remains an open empirical question whether testosterone use causes changes in sexual attractions, whether the individuals undergoing hormone therapy feel more confident or freer to explore a wider range of their sexual attractions, some combination thereof, or whether there is no known predictor for sexual fluidity in transgender men.

It is interesting to note that in the current study, education predicted sexual fluidity among transgender men, such that having less education was associated with more fluidity of sexual attractions. The association between education and fluidity in sexual attractions is consistent with previous research with transgender individuals. However, the opposite pattern was found among transgender individuals undergoing a social transition in prior research (Katz-Wise et al., 2016); that is, in prior research, transgender individuals undergoing a social transition who had more education reported more sexual fluidity. It is possible that the student population in the current sample disrupted associations between education level and sexual attraction fluidity. However, although cisgender controls in the current study were more likely to be students, the same was not true for transgender men, who may have difficulty accessing education as a result of stigma. It is unclear why the association between education and fluidity of sexual attractions was in a different direction in this study compared with previous research; further research is needed to better understand this association.

One of the primary goals of this study was to examine whether and how sexual fluidity was associated with health-related outcomes among transgender men, compared with cisgender women and men. We found that fluidity in sexual orientation identity was associated with mental health outcomes in the predicted direction for transgender men and cisgender women; specifically, more fluidity in sexual orientation identity was associated with more adverse mental health outcomes. In addition, more fluidity in sexual orientation identity was associated with poorer vitality among transgender men and poorer social functioning among cisgender women. These findings are consistent with previous research, which found that lifetime fluidity in sexual attractions was associated with more adverse mental health outcomes among transgender individuals (Katz-Wise et al., 2016). However, in the current study, sexual fluidity was not significantly associated with any mental health or health-related quality of health outcomes among cisgender men. Therefore, these data suggest that patterns of sexual fluidity and health among transgender men are more similar to cisgender women than to cisgender men. Perhaps these

similarities can be explained by gender socialization related to stress reactivity (Dedovic, Wadiwalla, Engert, & Pruessner, 2009) and coping behaviors (Matud, 2004). Because transgender men and cisgender women were both socialized as women, these two groups may react similarly to (minority) stress; for example, by engaging in emotion-focused coping, which is more common among (cisgender) women compared to (cisgender) men (Matud, 2004). More research is needed to further examine these potential pathways between sexual fluidity and health.

Sexual orientation identity fluidity may be associated with more adverse health among transgender men and cisgender women for a number of reasons. Movement toward a sexual minority identity has been linked to increased depressive symptoms (Everett, 2015), which may reflect experiences of sexual minority stress if an individual is newly exposed to discrimination and prejudice (Meyer, 2003; Mohr & Sarno, 2016; Parra, Benibgui, Helm, & Hastings, 2016). Although the numbers in the current study were too small to assess associations between directionality of fluidity in sexual orientation identity and health-related outcomes, we know that among transgender men in the current study, it was more common to switch from a heterosexual identity to a sexual minority identity than to switch from a sexual minority identity to a heterosexual identity or to switch between any two sexual minority identities across the year-long study. This could account for the significant association between sexual fluidity in identity and adverse health outcomes among transgender men, which may reflect minority stress related to newly identifying as a sexual minority.

Another potential reason for this association is that transgender individuals' experiences of their own sexual orientation may not fit previously understood concepts of sexual orientation that are cisnormative (based on cisgender experiences). For instance, attraction to other transgender individuals may be difficult to capture within most sexual orientation identity labels that are based on a binary notion of gender (e.g., heterosexual, bisexual, lesbian/gay). Prior research suggests that it is common for transgender individuals to use the identity label *queer* to describe their sexual orientation (Katz-Wise et al., 2016). Although transgender men in the current study did not widely report identity labels such as *queer* or *pansexual*, the number of changes in sexual orientation identity in this group may reflect a search to find a label that more accurately describes transgender men's sexual orientation than what was culturally (or even subculturally) available at the time the data were collected. This potential mismatch between felt orientation and available identity labels may cause additional identity-related stress that negatively impacts health.

In addition to the potential explanations above for associations between sexual orientation identity fluidity and health outcomes, fluidity in sexual orientation identity may also reflect movement from one social community to another. For example, transgender men who identify as heterosexual, and particularly those with a male identity rather than a transgender male identity, may associate themselves more strongly with cisgender heterosexual men. Similarly, transgender men who identify with a sexual minority identity may identify more strongly as part of the LGBQ (lesbian, gay, bisexual, queer) community. For individuals in either situation, movement toward either a sexual minority identity for a heterosexually identified individual or movement toward a heterosexual identity for an individual with a sexual minority identity may change access to community support and resources, which may negatively affect health. Indeed, previous research has found that group affiliation is protective against adverse mental health for transgender individuals (Testa, Jimenez, & Rankin, 2014; White Hughto, Reisner, & Pachankis, 2015), and that transgender community belongingness is important for the mental health of transgender individuals (Barr, Budge, & Adelson, 2016). Therefore, movement away from LGBQ community, and the support associated with membership in that community, may be particularly detrimental to transgender men's health. In this study, we were unable to assess how directionality of sexual fluidity is associated with health; this would be an important area for future research to determine whether community affiliation may be an important factor.

This study had a number of strengths, including the longitudinal study design, and the use of cisgender comparison groups, in addition to transgender men. Furthermore, the sample of transgender men represented all geographic regions of the United States, and both transgender men and cisgender individuals represented diverse race/ethnicities and city types (i.e., metropolitan/large city, small city, rural/country). As with all research, this study had a number of limitations. First, the transgender group was limited to transgender men who had recently begun testosterone. Therefore, results from this study cannot be generalized to transgender individuals with other gender identities (e.g., transgender women, non-binary individuals) or to transgender men who are not taking testosterone. However, considering that little research has focused specifically on transgender men's experiences, this study offers a significant contribution to the field of transgender health research. Second, cisgender individuals in this study were primarily from the south central United States, and may not represent the experiences of individuals from other geographic regions. Third, substance use and suicidality were assessed among transgender men, but not among cisgender individuals. Future research could examine associations between sexual fluidity and substance use and suicidality among cisgender individuals, as a comparison to the findings among transgender men in the current study. Finally, the measure used to assess fluidity in sexual attractions was binary (women/men) and did not include response options that reflected attractions toward individuals with transgender or non-binary gender identities (e.g., genderqueer, agender).

This study has a number of implications for clinical practice with transgender men. It is important for medical and mental health providers to know that fluidity in sexual attractions and sexual orientation identity is common among transgender men, and that it can be linked to adverse health outcomes—particularly adverse mental health. Providers working with transgender men can help to normalize these experiences, as well as connect their patients and clients to support and resources, if needed. This may be particularly important for transgender men who no longer identify with the LGBQ community, as these individuals may have lost the protective effects that membership in that community confers (Testa et al., 2014; White Hughto et al., 2015). Understanding that fluidity in sexual attractions and sexual orientation identity among transgender men is not only possible, but common, highlights the importance of assessing attractions and sexual behavior more often than just at initial intake. Assessing sexual orientation identity more frequently at clinical visits can identify individuals who may be at higher risk for adverse health outcomes

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related to changes in sexual orientation identity; for example, fluidity in sexual orientation identity may reflect changes in the gender of one's sexual partners, which has implications for sexual health counseling and behavioral risk assessments. Knowledge of sexual fluidity can enable providers to connect their clients/patients to appropriate support and resources.

In conclusion, to our knowledge, this is the first study to examine fluidity in both sexual attractions and sexual orientation identity, using a longitudinal design. To our knowledge, this is also one of the first studies to test for associations between sexual fluidity and health-related outcomes among transgender men, who have recently begun testosterone, using cisgender comparison groups. Results suggest that transgender men reported more sexual fluidity than cisgender individuals, and that among transgender men and cisgender women—but not cisgender men—fluidity in sexual orientation identity was associated with adverse health outcomes, particularly mental health. Future research could assess associations between directionality of sexual fluidity and health to determine whether community affiliation and loss or gain of community support may be related to health outcomes. Future research could also examine associations between sexual fluidity and substance use and suicidality among cisgender individuals, and develop measures of sexual fluidity that include attraction to transgender and non-binary individuals. This research expands our knowledge about the relationship between sexual orientation identity fluidity and health, and suggests that medical and mental health providers working with transgender men should be aware of these potential impacts so that they can offer the necessary support and resources.

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